

Programs Automate Complex Operations Monitoring

Originating Technology/NASA Contribution

Kennedy Space Center, just off the east coast of Florida on Merritt Island, has been the starting place of every human space flight in NASA's history. It is where the first Americans left Earth during Project Mercury, the terrestrial departure point of the lunar-bound Apollo astronauts, as well as the last solid ground many astronauts step foot on before beginning their long stays aboard the International Space Station. It will also be the starting point for future NASA missions to the Moon and Mars and temporary host of the new Ares series rockets designed to take us there.

Since the first days of the early NASA missions, in order to keep up with the demands of the intricate and critical Space Program, the launch complex—host to the large Vehicle Assembly Building, two launch pads, and myriad support facilities—has grown increasingly complex to accommodate the sophisticated technologies needed to manage today's space missions. To handle the complicated launch coordination safely, NASA found ways to automate mission-critical applications, resulting in streamlined decision-making. One of these methods, management software called the Control Monitor Unit (CMU), created in conjunction with McDonnell Douglas Space & Defense Systems, has since left NASA, and is finding its way into additional applications.

Partnership

Command and Control Technologies Corporation (CCT), of Titusville, Florida, was founded in 1997 with the express purpose of commercializing technologies developed by NASA. A team of McDonnell Douglas contractors at Kennedy had helped develop CMU to manage NASA's complex space station checkout. Realizing that this software had applications outside of the NASA realm, they formed CCT and licensed the software usage rights from NASA (*Spinoff* 1999). Two years after its founding, CCT was named Kennedy's "Small Business Contractor



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of the Year," and the company has continued supporting the Space Agency with cutting-edge software.

As CCT's founders realized, a lot of the same management technologies created for NASA launches apply to other complex yet critical operations. CCT has therefore found applications outside of its NASA work helping the military at weapons test ranges, protecting the borders,

and it has the potential to work with large industrial processes, like monitoring and managing power plants.

Product Outcome

CCT delivers products, engineering expertise, and support for aerospace, industrial, security, and defense applications. At the core of its capabilities is the software

initially developed with NASA and significantly improved over the last 12 years by CCT, marketed commercially as Command and Control Toolkit (CCTK). A turnkey system, the software is customizable to a wide array of intricate situations and capable of handling complex data in real time.

CCTK is robust and easy to use. It has a graphical interface and is flexible, easily configurable for real-time situational awareness, and capable of handling millions of data, command, event, and message transactions. It runs on any standard personal computer platform and can be customized by the company or directly by each user, depending on need.

CCT's software is capable of simultaneously handling incoming information from varied sources, while still calculating for a variety of additional factors, including safety and engineering aspects. A prime example of this flexibility is the work CCT is conducting at NASA's Wallops Flight Facility on Virginia's Eastern Shore. Managed by Goddard Space Flight Center, Wallops is a launch site used by not only NASA, but by the military and the research community. While the launch facility already offers the capacity and expertise needed to enable frequent flight opportunities for a diverse customer base, it expects that in the coming years, it will become increasingly called upon for commercial space launches.

CCT was contracted by Goddard to provide range safety decision support systems for the test facility at Wallops, as well as process telemetry and radar acquisition data and assist with early analysis for a redesign of the range control center. At Wallops, CCTK also monitors U.S. Navy launches at the site conducted by the nearby Naval Air Systems Command along the Patuxent River in Maryland.

The Virginia Space Flight Facility, also located at Wallops, has been using CCTK to automate its remote control rocket cryogenic fueling systems. Adding this capability is one of the first steps in gearing the facility for more commercial launches, as it greatly increases the

safety of launches by minimizing human exposure to hazardous conditions. CCT was recently contracted by the Virginia Commercial Space Flight Authority to design and develop a new launch vehicle fueling control system that will support the newly designed Orbital Sciences Taurus II launch vehicle, as well as other launch vehicles using the commercial pads at Wallops.



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CCT also received Small Business Innovation Research (SBIR) funding from the Air Force Research Laboratory to create gateways from various weapons systems to surveillance platforms. It collects information, integrates it into a common data format, and then presents the information so that military decision makers have access to all of the critical information. Additional government projects have included designing command and control systems for border protection that integrate radar, seismic, infrared, and proximity sensor data with auto-tracking cameras and automatic dispatch systems. These systems provide the U.S. Department of Homeland Security with accurate, real-time border security information. With an area as large as a border equipped with a wide variety of sensors, collecting and analyzing data to determine threats can be a daunting task. CCTK helps integrate the data and improve the quality of information that border patrol agents use to make interdiction decisions.

Having demonstrated success with its government clients, CCT has entered the commercial markets. Potential industrial avenues include energy generation, process control, and manufacturing.

For all of the technical support that NASA has shown CCT, the company has been able to reciprocate in turn by providing the Space Agency with valuable launch services and range safety research and development support. ❖

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